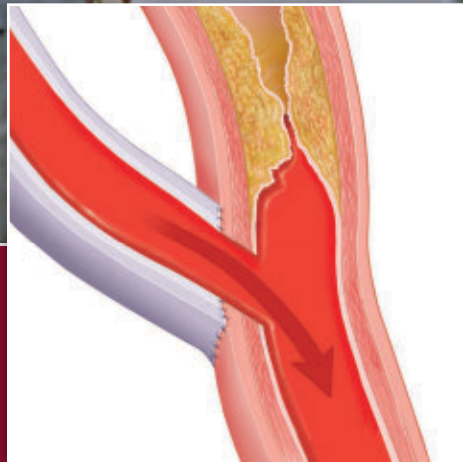


PERIPHERAL BYPASS SURGERY



Easing Leg and Foot Pain



Surgical Treatment for PAD

Peripheral arterial disease (PAD) occurs when the arteries that carry blood to the legs are narrowed or blocked. This limits blood flow to the legs, which can cause leg and foot pain and other serious problems. If you have PAD, your doctor may recommend a procedure called **peripheral bypass surgery** to treat it. This booklet tells you more about the surgery and what it may mean for you.

Signs and Symptoms of PAD

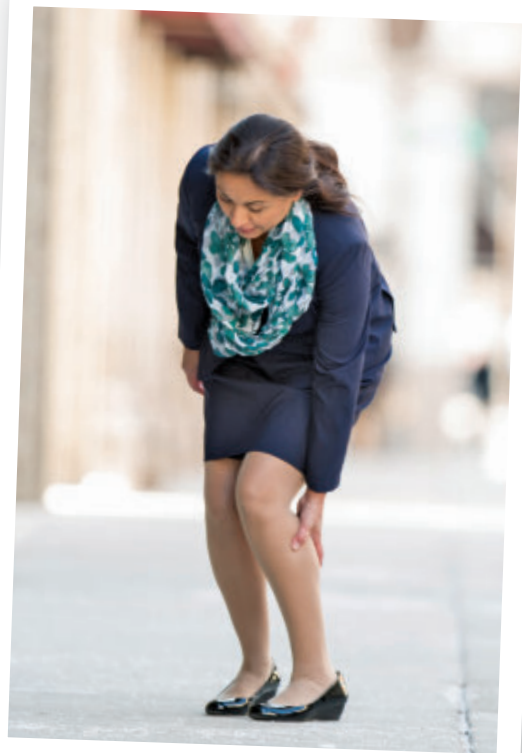
PAD can cause **claudication**. This is cramping, aching, or discomfort in your buttocks, thighs, or calves with exercise, such as walking. The pain goes away when you stop moving and returns when you move again. You may also have pain in the feet or toes when lying down. This is called **rest pain**. Other signs and symptoms of PAD include numbness, weakness, skin color or temperature changes, or sores on the legs and feet.

Risk Factors for PAD

Certain conditions and habits increase the chances of having PAD. These are called **risk factors**. Some common risk factors include:

- Smoking
- Diabetes
- High blood pressure
- Unhealthy cholesterol levels

Other risk factors are things you can't change, such as age and personal or family history of PAD, heart disease, or stroke.



PAD and Your Health

Without treatment and changes that help reduce risk factors, PAD can get worse. Your symptoms may limit your activities and affect your quality of life. If severe enough, reduced blood flow to the legs can lead to tissue death (**gangrene**). This may require the removal of a toe, foot, or leg. Having PAD also makes it more likely that arteries in other body areas are blocked. For instance, arteries that carry blood to the heart or brain may be affected. This increases the chances of heart attack and stroke.

How Bypass Surgery Can Help

PAD can't be cured, but treatment can help reduce symptoms. Your doctor can evaluate you and work with you to plan treatment. Bypass surgery may be your best treatment option. During the surgery, the doctor creates a new pathway for blood flow using a tube called a **bypass graft**. Blood can then pass around the part of an artery that is narrowed or blocked. This improves blood flow to the legs and feet, which helps to relieve symptoms and prevent tissue death. Before moving forward with surgery, be sure to talk with your doctor about all of your treatment options. Also get answers to any questions you may have.

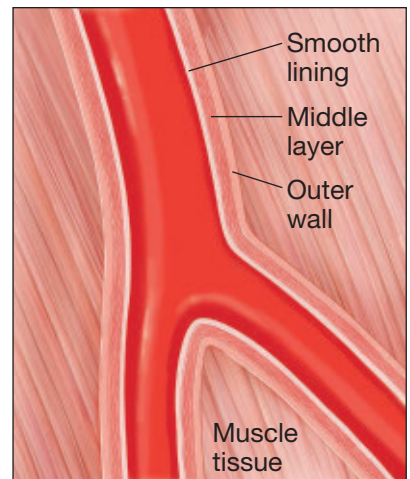
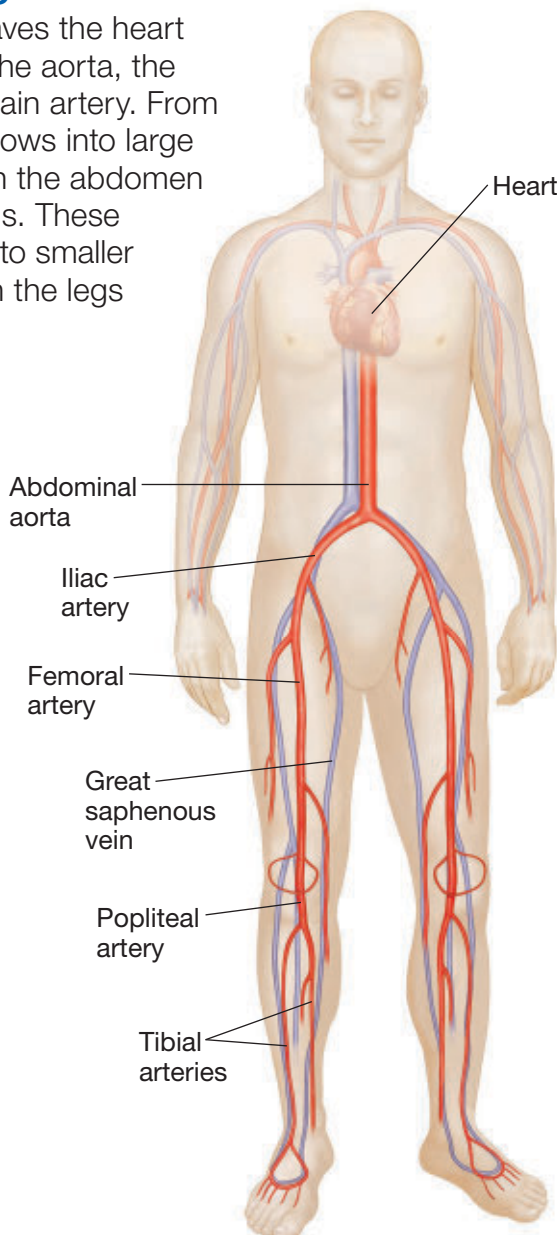


Understanding Arteries

With each beat, the heart pumps oxygen-rich blood throughout the body. **Arteries** carry this blood to the organs and muscles. **Veins** then return oxygen-poor blood to the heart. If an artery is damaged, blood flow may be slowed or blocked. This means that muscles and organs don't get all the oxygen they need.

The Flow of Blood Through Arteries

Blood leaves the heart through the aorta, the body's main artery. From there, it flows into large arteries in the abdomen and thighs. These branch into smaller vessels in the legs and feet.

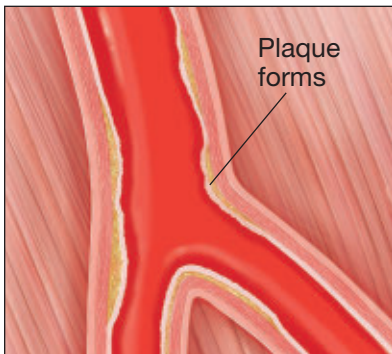


A Healthy Artery

An artery is a muscular tube. It has a smooth lining and flexible walls that allow blood to flow freely. Active muscles need increased blood flow and oxygen. Healthy arteries can adapt to meet this need.

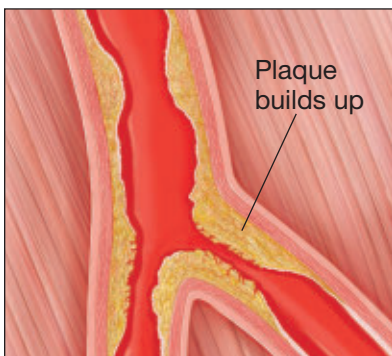
When Blood Flow Changes

Arteries become stiffer and thicker with age. The lining of the arteries can be damaged by smoking, unhealthy cholesterol levels, and other factors. This allows **plaque** (a buildup of fat, cholesterol, and other materials) to form within artery walls. The plaque narrows the space inside the artery and can limit or block blood flow.



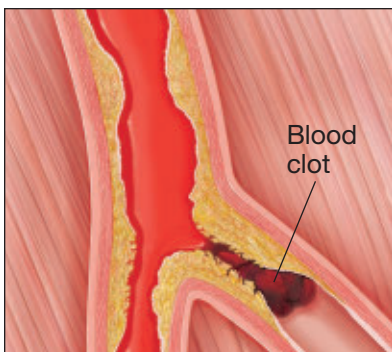
A Damaged Artery

PAD begins when the lining of an artery is damaged. Plaque then starts to form within the artery wall. At this stage, blood still flows normally, so you're not likely to have symptoms.



A Narrowed Artery

If plaque continues to build up, the space inside the artery narrows. The artery walls become less able to expand. During rest, the artery still provides enough blood and oxygen to your muscles. But during activity (like walking), the increased demand for blood can't be met. As a result, your leg may cramp or ache when you walk.



A Blocked Artery

An artery can become blocked by plaque or a blood clot. This prevents oxygen from reaching muscle below the blockage. Then you may feel pain even when lying down. Without enough oxygen, the affected tissue can die. This can lead to the loss of a toe, foot, or even a leg.



With PAD, more than one area of a leg can be affected. Common areas of blockage are shown in dark red.

Your Evaluation

Your doctor will evaluate you to learn the extent of your PAD. This includes taking a health history and performing a physical exam. Certain tests will also be done. Some help assess the blood flow in your legs. Others can show which arteries are narrowed or blocked.

Health History

Describe your symptoms and any health problems you have. Also mention past treatments and any medications you're taking. The doctor will likely ask about your risk factors. This includes questions about your family health history and your lifestyle, such as if you smoke.

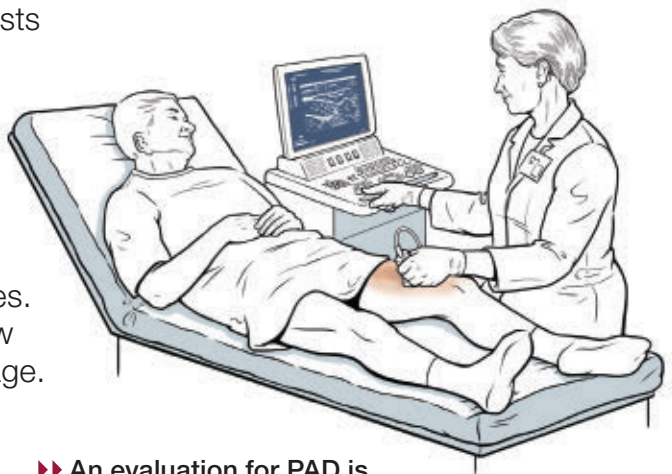
Physical Exam

Plaque can form in blood vessels throughout the body. For that reason, your doctor will feel for pulses and listen to blood flow in the major arteries. Your upper arms, neck, and abdomen are likely to be checked. Your feet and legs will also be examined for signs of PAD. These include changes in skin color and temperature and sores that don't heal.

Tests to Measure Blood Flow

You may have tests that check the blood flow in your legs and feet. These tests are quick and painless.

- **Ankle-brachial index (ABI)** compares blood pressure in your ankle with pressure in your arm.
- **Duplex ultrasound** looks at the blood flowing through your arteries. It can show changes in blood flow due to artery narrowing or blockage.



►► An evaluation for PAD is likely to include ultrasound.

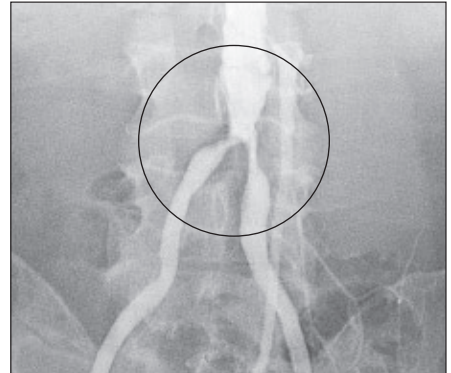


Imaging Tests

Imaging tests can show the amount and location of damage in an artery. Your doctor will use the results to help plan the best treatment for you.

Arteriography

This test is used to plan surgery. During the test, x-rays help pinpoint where the artery is narrowed or blocked. Before the procedure, you are given medication to relax you and keep you from feeling pain. A long, thin tube (**catheter**) is put into an artery, most often in the groin. The catheter is carefully moved into the affected artery. A contrast fluid is then injected through the catheter into the artery. This makes the blood flow show up clearly on x-rays (**arteriograms**).



▶▶ This arteriogram shows narrowing in both of the main arteries leading to the legs. The sites are shown in the circle above.

Other Imaging Tests

You may have other tests to help detect a narrowing or blockage. Contrast fluid may be used to make arteries show more clearly.

- **CT arteriography** uses a computer and x-rays to provide detailed images of the arteries.
- **MR arteriography** uses a strong magnet and radio waves to produce images of blood flow in the arteries.

Risks and Complications of Arteriography

These can include:

- Bleeding, bruising, infection, or pain at the catheter insertion site
- Allergic reaction to the contrast fluid
- Blood clots
- Artery damage
- Kidney problems



Is Surgery Right for You?

Based on the results of your evaluation, you and your doctor will review possible treatments. Depending on several factors, peripheral bypass surgery may be the best treatment for you. Before making a decision about surgery, be sure to discuss any questions or concerns you have with your doctor.



Be Informed

In some cases, PAD can be managed with medications and lifestyle changes alone. Certain procedures may be done to widen a narrowed or blocked artery or remove plaque from an artery. If medications or procedures have been tried but you still have symptoms, bypass surgery may now be your best option. Discuss the benefits of surgery with your doctor. Any surgery has risks, so be clear what these risks are for you. Also know what you need to do to prepare for surgery and recover from it. By being informed, you can help your doctor ensure that your needs are met.

Risks and Complications of Bypass Surgery

These can include:

- Bleeding
- Infection
- Blood clots
- Lung problems
- Nerve damage and numbness
- Risks of anesthesia
- Need for second bypass or surgery to remove dead tissue (amputation)
- Heart attack, stroke, or death



Preparing for Surgery

Once surgery is scheduled, you'll be told how to prepare for it. Follow these instructions carefully.

Before Surgery

- **If you smoke, quit right away.** Smoking increases the risk of poor healing, graft failure, and other problems after surgery.
- **Have any tests your doctor orders.** These can include a chest x-ray, blood tests, and ECG (electrocardiogram).
- **Tell your doctor about all the medications you take.** This includes over-the-counter medications, herbal remedies, and supplements. If you take medications to prevent blood clots, be sure to mention them. You may need to stop taking some or all of them before surgery.
- **Stop eating and drinking as directed before surgery.** This includes water, gum, and mints. (If you have been told to take any medications before the surgery, take them with small sips of water.)

On the Day of Surgery

- An IV (intravenous) line is put in your arm or hand to give you fluids and medications.
- If needed, hair on your leg or other surgical sites is removed.
- You may be asked more than once to provide your name and the surgery you're having. This is for your safety. Also, the leg to be operated on will be marked.
- You'll be given anesthesia to prevent pain during the procedure. **General anesthesia** may be used, which puts you in a state like deep sleep during surgery. Or **regional anesthesia** may be used, which numbs you from the waist down. You may also be given medication to keep you relaxed and drowsy during surgery.



How Bypass Surgery Is Done

During bypass surgery, a new pathway is created around the blocked part of a leg artery. This is done using a bypass graft. Your doctor can tell you more about the type of graft you will have and what to expect during your surgery.

Types of Bypass Grafts

There are different types of bypass grafts:

- **A vein graft** is often a healthy vein from the same leg where the bypass is being done. If needed, a vein from the other leg or the arm may be used instead. A vein graft is suitable for blocked arteries above or below the knee.
- **A manmade (synthetic) graft** comes from materials that are easily accepted by the body. It works best on arteries at or above the knee.
- **A donor graft** is a healthy blood vessel from a human donor. It may be needed in some cases of bypass surgery.

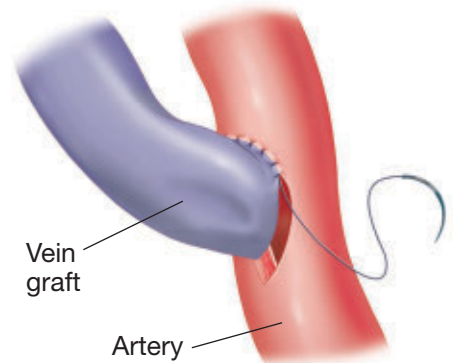
Possible Incision Sites

Your doctor will make one or more incisions to prepare and attach the bypass graft. Some possible incision sites are shown below. The exact sites will vary depending on the location of the blockage, the type of graft used, and the technique used for surgery.

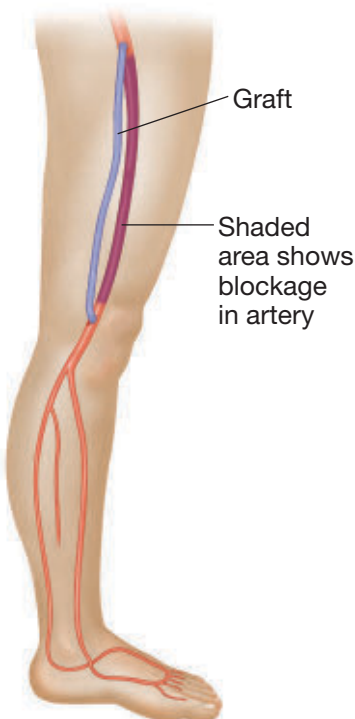


Attaching the Graft

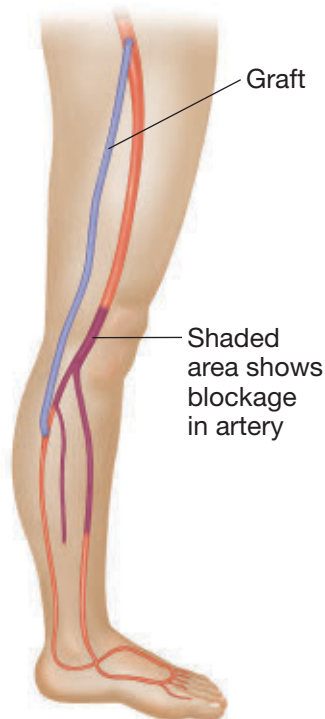
Once the graft is ready, it is sewn into place above and below the blockage. In most cases, one end of the graft is sewn to the femoral artery in the thigh. The other end is sewn to an artery farther down the leg. X-rays or an ultrasound is done to make sure that blood is flowing through the graft properly. When the surgery is complete, all skin incisions are closed with stitches (sutures) or staples.



Possible Sites for the Bypass Graft



A femoral popliteal bypass
ends near the knee.



A distal (lower leg) bypass
ends below the knee.

Your Recovery

After surgery, you'll be taken to a recovery area or intensive care unit. Nurses will monitor you closely. You'll then be moved to a hospital room. Expect to be in the hospital from a few days to a week. Once home, follow any discharge instructions you're given.

Right After Surgery

When you wake up after surgery, you may feel groggy, thirsty, or cold. Your leg may swell and be painful. But you'll be given medication to help control pain. You may also be given medication to help prevent blood clots and infection. Your pulses will be checked regularly to make sure that blood is flowing properly through your new graft. Once you are stable, you'll be moved to a hospital room.



In the Hospital

To aid your recovery, nurses or therapists will teach you exercises to keep your lungs clear. They'll also help you get up and walk. You may be told to raise (elevate) your legs above heart level when you're lying down. This helps reduce swelling. Tell your nurse or doctor right away if the leg that was operated on feels cold or numb or looks pale. Also mention if you have any other symptoms that concern you. Before going home, you may be taught to take the pulse in your leg.

Why Walk?

Walking is a big part of your early recovery. It helps reduce swelling, improve blood flow, and speed healing. It also helps prevent lung problems, such as pneumonia. Keep in mind that the sooner you recover in the hospital, the sooner you can go home.

At Home

- Take all medications as directed. This may include pain relievers, aspirin, or other medications to prevent blood clots.
- Care for your incisions as instructed. Check daily for signs of infection (see “When to Call the Doctor” below).
- Elevate your legs above heart level from time to time throughout the day.
- Walk as often as you feel able each day.
- Avoid heavy lifting for as long as directed.
- Follow your doctor’s instructions about driving and going back to work.



Follow-Up Care

Keep all follow-up appointments with your doctor. Sutures or staples are usually removed about 2 weeks after surgery. Going forward, you may need to see your vascular or primary care doctor for regular visits. These allow your doctor to monitor your health and how well your PAD is being managed. You may also need regular imaging tests to help make sure your graft is working well.

When to Call the Doctor

After surgery, call your doctor if you have:

- Chest pain or trouble breathing (call 911)
- Fever of 100.4°F (38°C) or higher
- Unusual pain, redness, warmth, swelling, bleeding, or drainage at the incision sites
- Leg swelling that doesn’t improve overnight
- Changes in color, temperature, feeling, or movement in the operated leg
- Changes in pulse in the operated leg
- A return of symptoms similar to those you had before the bypass



Reducing Your Risks

Bypass surgery can improve blood flow and relieve symptoms, but new blockages can still form. You can take steps to prevent this by managing your risk factors for PAD. Doing so can improve the health of all your arteries and reduce the risk of heart attack and stroke. Work with your doctor to identify your risk factors and get them under control.

Quit Smoking and Other Tobacco Use

Using cigarettes and other forms of tobacco damages your arteries. It also decreases circulation and makes a graft more likely to fail. These tips may help you quit smoking:

- Ask your doctor about medications or products you can use to help you quit smoking.
- Get support. Join a stop-smoking program or support group. Ask for help from your family and friends.
- Make a list of things that make you want to smoke. Plan how you can avoid these “triggers” or deal with them without smoking.

Be More Active

Exercise plays a major role in managing artery disease. It helps you lose weight, maintain healthy blood pressure and cholesterol levels, and control diabetes. To help you get started with exercise, your doctor will likely prescribe a walking program. Use the guidelines below to help make your program a success:

- Start slowly. Take one or two short walks each day. As you get stronger, try to increase your time and distance.
- Don't walk too fast. If you're short of breath or can't carry on a conversation, you're pushing yourself too hard.
- Track your progress. Use a pedometer, smartphone, or other device, to track how far and how long you walk each day.

Note: Some hospitals or rehab centers have supervised walking programs. Ask your doctor if one is right for you.



Eat Healthy

Making healthy eating changes can improve cholesterol levels and lower blood pressure. This can make arteries healthier and help prevent plaque buildup. Eating well can also help you lose excess weight and manage blood sugar. To get started with healthy eating, try these tips:

- Eat more fruits, vegetables, and whole grains.
- Choose the right kinds of fats (vegetable oils, nuts, seeds, fish). Limit saturated fats (red meat, full-fat dairy products). And avoid trans fats (fried foods, fast foods, baked goods).
- Cut back on salt (sodium), if instructed. Too much salt can raise blood pressure in some people.
- Limit added sugars (soda, candy, pastries) and refined grains (white bread, white rice, or regular pasta).

Manage Health Problems

Managing other health problems is a big part of keeping your arteries healthy. Talk to your doctor about the best way to control diabetes, high blood pressure, unhealthy cholesterol levels, or heart disease. Here are some general guidelines:

- Take medications as directed. Don't skip days or stop taking them without your doctor's okay.
- If you have diabetes, try to keep your blood sugar well controlled. Test your blood sugar as directed.
- Have your cholesterol and blood pressure checked as often as directed.
- Maintain a healthy weight.

Take Care of Your Feet

Along with managing risk factors, you need to take care of your feet. This is because PAD raises the risk of poor healing of sores or blisters on the feet. Problems with blood flow also make feet tender and easier to bruise or infect. To protect your feet:

- Wash and dry your feet carefully. Avoid skin burns by testing the temperature of bath and shower water before you get in.
- Wear comfortable shoes. Avoid high heels and shoes with open toes.
- Have your doctor or a podiatrist (foot specialist) trim your toenails.
- See your doctor if you have cuts or wounds on your feet.



Work with Your Doctor

If you have PAD, peripheral bypass surgery is a treatment that might help. It can improve blood flow and relieve painful leg and foot symptoms. It can also help prevent more serious problems. Talk with your doctor. Find out if bypass surgery is the right choice for you. Also ask if other treatments might be good options as well. By working together with your doctor, you can find the best treatment for your needs.

Resources

To learn more about PAD and treatment options, search “PAD” on these websites:

- **American Heart Association**
www.heart.org
- **Society for Vascular Surgery**
www.vascular.org

Also available in Spanish

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